SECRET

MONTHLY REPORT

25X1

PAR 204
1 May 64

SUBJECT: Contact Chip Printer

TASK/PROBLEM

1. Develop and fabricate a contact printer to expose 4 x 5 inch film chip prints with minimum loss of information from selected areas of high quality roll negatives (up to 200 lines/mm resolution).

2. Each chip will have a two-line title across one end: the first line human readable, and the second to repeat the first in machine-readable characters.

DISCUSSION

3. The revised technical objectives were presented to the customer on 27 April 64.

PLANNED ACTIVITY

4. We are now awaiting comment upon or approval of the revised objectives as submitted.

Declass Review by NGA.

GROUP-1
Excluded from automatic downgrading and declassification

SECRET

PAR 204-A

Recd 17 apr 64

CONTACT CHIP PRINTER

14 Apr 1964

Approved For Release 2005/05/02 : CIA-RDP78B04770A002100070008-5

PROJECT AUTHORIZATION REQUEST

PAR 204-A
14 Apr 64

SUBJECT: Contact Chip Printer

TASK/PROBLEM

1. Develop and fabricate a contact printer to expose 4 x 5 inch film chip prints with minimum loss of information content from selected areas of high quality roll negatives (100 to 200 lines/mm resolution). Each chip will have a two-line title across one end: the first line human readable, and the second to repeat the first in machine-readable characters.

PROPOSAL

2. Design studies to explore problems in certain critical components of the contact Chip Printer will be made, and an over-all design concept will be established. This phase of activity will be followed by design and fabrication of a prototype printer.

3. We now expect to make design studies in the following problems. Others may be added as the work progresses.

a. Negative Handling: A means must be provided to quickly present the selected negative area to be printed at the printing gate from numeric specifications of the frame number and X-Y coordinates. It is proposed that the successful Motorized Rewind System be adapted to this requirement. Modifications to be considered are:

(1) Add a film driven metering roll and indicating mechanism to measure the along-film coordinate.

(2) Add an adjustable indicating mechanism to the metering roll to count and indicate frame numbers as the film is wound at high speed.

(3) Provide a means to traverse the film transport in the across-film direction for viewing the film over an illuminator and to position any point across the film width at the center of the printing gate.

b. The Contact Printing System: Because of the excellent performance and basic advantages of the drum-type continuous printer in producing high-resolution prints, we will consider a stationary-arch arrangement, at the printing gate of the printer. In this proposed arrangement, the negative and print stock, both in roll form and with parallel edges, will be placed in contact and under tension upon the surface of a cylindrical arch. A soft rubber roller under pressure (squeegee roller) will be passed across the area to be printed to eliminate the residual air layer separating the two films. The film surfaces are to be swept by cleaning stations before placing them in contact.

c. The Output Materials

(1) The chip will be 4 x 5 inch print in any one of the three formats shown in Figure 1. A complete chip will be produced by a double exposure process in which one exposure produces the image from the selected negative area and the second produces the "format" pattern including:

(a) A fiducial mark at the center of each side of the image area to indicate the location in the image of the specified X-Y coordinates.

(b) The security code in two locations.

(c) A two-line title across one end of the chip. Each line of the title will contain about 43 characters. The first line to be in human readable characters; the second line to be a duplicate of the first, except presentation will be in machine-readable code.

(d) Edges of the chip will be alignable in any orientation with the negative. The relative orientation will be established with ±1 degree accuracy and recorded as part of the title.

(2) Study will give consideration to a system in which the chip format pattern, with trim guide marks added, will be exposed through the base of the print stock by optical projection in the same location at which the photo image is exposed from the emulsion side. Raw stock will be 9 1/2-inch wide film, maintained in a given orientation to the negative. A means will be provided to orient the titling format as required relative to the masked chip image from the negative. A rotatable mask, coupled to the titling format image-rotation system, will restrict the area of the photograph exposed during the titling exposure operation.

(3) A convenient means will be devised to produce the chip title. Present plans are to employ a system in which the title is printed and punched on a standard, 80-column data-handling system punched card (or Title Card); then the punched title card is inserted into a Title Generator on the printer which will expose all or a selected part of the data punched in the card. Next, it seems feasible to convert the punched data to the chip title by using the punched holes as selecting apertures over a photo plate containing the desired human-legible and machine-readable characters.

*(4) Commercially available apparatus ranging from a relatively simple keyboard operated card punch, or a system coupled to computer, can be used to generate the Title Cards. With such a system, the accuracy of the title can be checked before the chip print is exposed.

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* This system of generation of the format and the physical production of the chip appears to be applicable to the 4X Chip Enlarger (PAR 205-A).

d. Printer Arrangement

(1) A variety of arrangements will be considered to provide in a convenient combination:

(a) Rapid loading and unloading of the negative rolls.

(b) A safelight viewer for previewing and exposure monitoring of the selected negative area before placement in the printing gate.

(c) Cleaning of the film surfaces and near vertical orientation of the film surfaces in the printing gate to minimize dust collection.

(d) Easy access to the insertion point of the Title Card.

(e) Easy access to the print stock spools and means to remove short and moderate lengths of exposed print film for processing.

(f) Easy means to enclose the exposed and unexposed print stock to permit printer adjustments by white light.

(2) A design goal in the study of arrangements will be a compact, easily movable instrument.

e. Exposure Monitoring and Control: Consideration will be given to reading the negative density at the preview station to predict the required exposure. The possibility of reading integrated transmittance with subject classification will be explored. Also to be considered is the possibility of automatically exposing a number of prints in an exposure series ranging above and below the predicted nominal to give the photo interpreter a choice of print density level for optimum viewing and for density matching of stereo pairs.

f. Light Source: For black-and-white prints, a narrow-band filtered high-pressure mercury arc source is proposed. Our experience with contact printing indicates this type of source provides maximum image sharpness.

g. Color Prints: Capability for color-print exposure has not been included in our estimates. However, we propose to design the equipment such that moderate modifications and additions can provide this capability. The anticipated changes are:

(1) Replacement of mercury arc source by a tungsten lamp.

(2) Addition of appropriate color filtering in the exposure prediction equipment.

(3) Addition of means for adjustment of color balance in the printing light.

Because of the potential usefulness of the prototype printer from this project for black-and-white print production, we urge that if the color print capability is desired it should be authorized as a separate project resulting in a separate prototype. This additional project would require new design only for those elements that must be changed for color.

*h. Accessory Equipment

(1) Equipment will be designed to accomplish chip cutting as a two-step process. The first step will be a rough square-cut across the print roll to separate each chip image. The second step will be to cut out the 4 x 5 inch chip by a punch and die after manual-visual positioning.

(2) The chip die will be designed to handle Estar or acetate materials. Present experience indicates punch and die life when used

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with Estar is only about 25 per cent of the normal life expectancy when used with acetate base materials. Proper sharpening of the punch and die should insure quality chip forming with a good life expectancy of the cutter.

(3) It is proposed to make the chip cutout equipment safe, rugged, and simple as possible. After experience is gained in the use of the printer and the chip cutting equipment, a better judgment concerning automatic chip cutting can be made and additional equipment developed as required and/or directed.

4. Special consideration will be given to:

a. Maximum image quality

b. Reliability

c. Ease of maintenance

5. Since special emphasis must be placed on the three (3) items listed in paragraph 4 above, the requirements listed below have been reviewed and will be incorporated in the design only to the degree indicated.

a. Accept two (2) rolls of negative film: To reduce complexity and maintain quality, printer will be designed to accept only a single roll of negative film.

b. Automatic threading: Automatic thread-up of the printer would increase complexity, reduce reliability and tend to endanger original thin base negatives. Thread-up will be as simple as possible without full automatic threading.

c. Punch card data input: This type of input is suggested rather than an external keyboard or punched tape (see paragraph 3, c, (4) above).

d. Adjustable X-Y measurement (rubber meter stick): A practical solution that will keep complexity at a minimum and insure quality is not known at this time (see paragraph 3, a, (1).

e. Automatic Exposure Control: The proposed system for exposure control is not fully automatic in that it includes operator judgment of the spot to be read or of the subject classification (see paragraph 3, e).

6. Present Design Objectives:

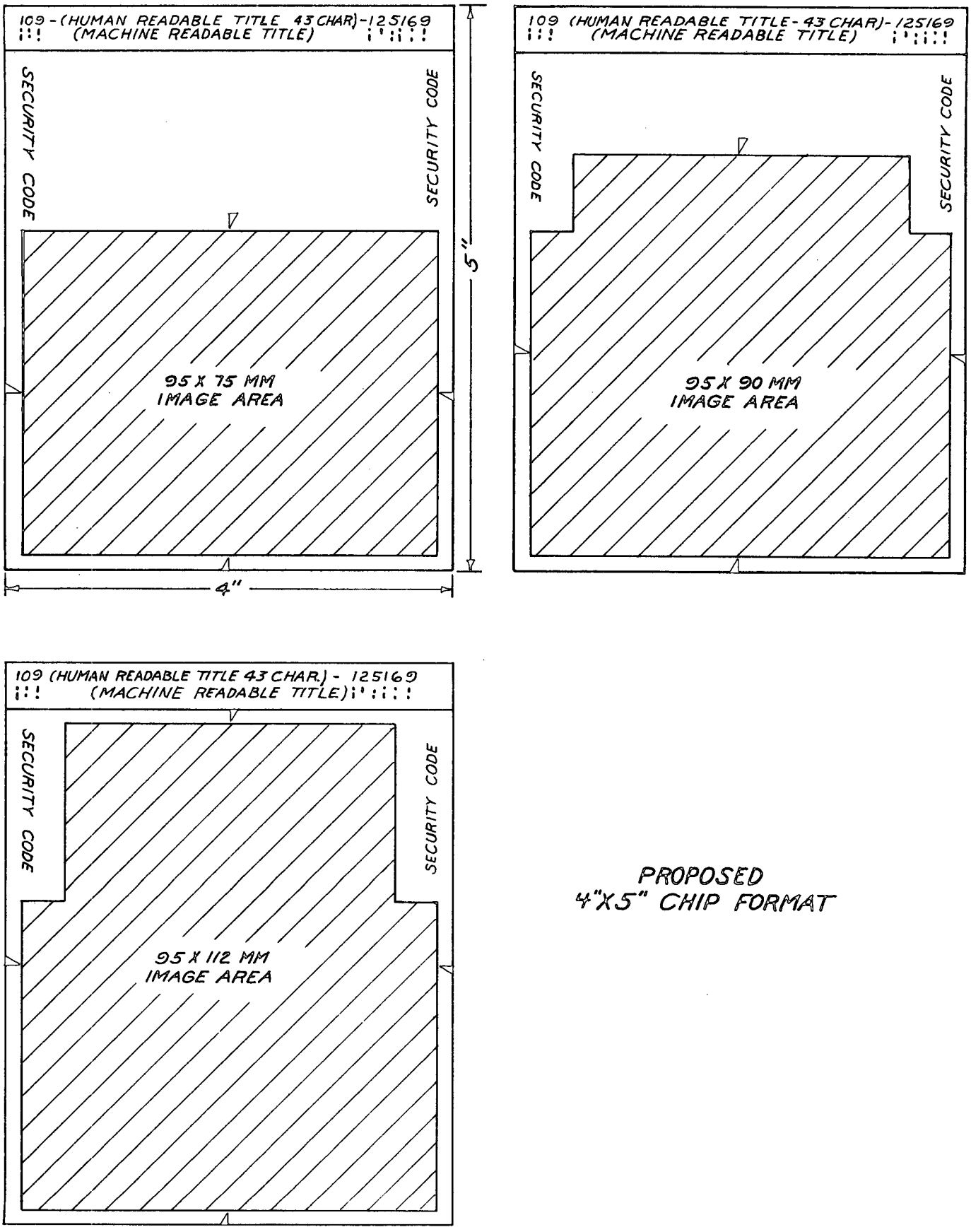
a. Print output: 4 x 5 inch film chip with variable formats (3 only, see Fig. 1) title, security code label and fiducial marks. The chip format may have any chosen orientation relative to the original negative.

b. Negative Handling: Provide for roll film, 70mm to 9 1/2-inch wide and lengths up to 500 feet on MIL Standard spools.

c. Printing Capability: To provide prints from high quality black-and-white roll negative (100 to 200 lines/mm resolution) with minimum loss of information content. Print stock to be any 9 1/2-inch roll material without color sensitization, such as Type 8430.

d. Film Cleaning: The film surfaces are to be cleaned, possibly by a static eliminator, rotating brush and vacuum cleaner system, before being placed in contact.

e. Printing Gate: Means will be provided to quickly present to the printing gate, from frame number and X-Y coordinate identification, the negative area to be printed. It will be possible to place any point within the negative area at the center of the printing gate.



PROPOSED
4"X5" CHIP FORMAT

FIGURE 1

f. Provide an exposure monitoring photometer.

g. Exterior design: To be smooth to facilitate cleaning as required for proper housekeeping in film handling areas.

h. Insure high efficiency, simple construction and low maintenance requirements.

PROGRAM OBJECTIVE

7. To design, fabricate, test and deliver one Contact Chip Printer, it is proposed that the effort be scheduled in two phases.

a. Phase I: Provide preliminary design and final specifications. Reaching these goals will require construction of breadboards and/or models for testing of the following subassembly designs.

(1) The contact printing system.

**(2) Titling system including format rotation capability.

(3) Print stock roll holder.

**(4) Integrated transmittance exposure photometer and exposure control system.

***(5) Negative transport system with X-Y coordinate measuring and frame counting.

b. Phase II: Complete the design, fabricate and accomplish in-house testing of the prototype Contact Chip Printer.

8. Upon completion of Phase II, the instrument will be crated and prepared for shipment pending special instructions from the customer.

** Test and evaluation of item (2) and (4), paragraph 7, a. can be accomplished jointly with similar efforts on PAR 205-A Chip Enlarger.

*** Test and evaluation of item 5, paragraph 7, a. will have many steps in common with a similar task on PAR 224, 3-15X Fluid Gate Enlarger; PAR 202-A, Briefing Print Enlarger; and PAR 205-A, 4X Chip Enlarger.

SCHEDULE

9. Tentative schedule covering Phase I is shown in Figure 2. Although the tentative schedule shows approximately fourteen months for completion of Phase II, detail scheduling can only be furnished on or near completion of Phase I and will be furnished at that time for consideration by the customer.

TENTATIVE SCHEDULE

CONTACT CHIP PRINTER

PAR 204-A
14 Apr 64

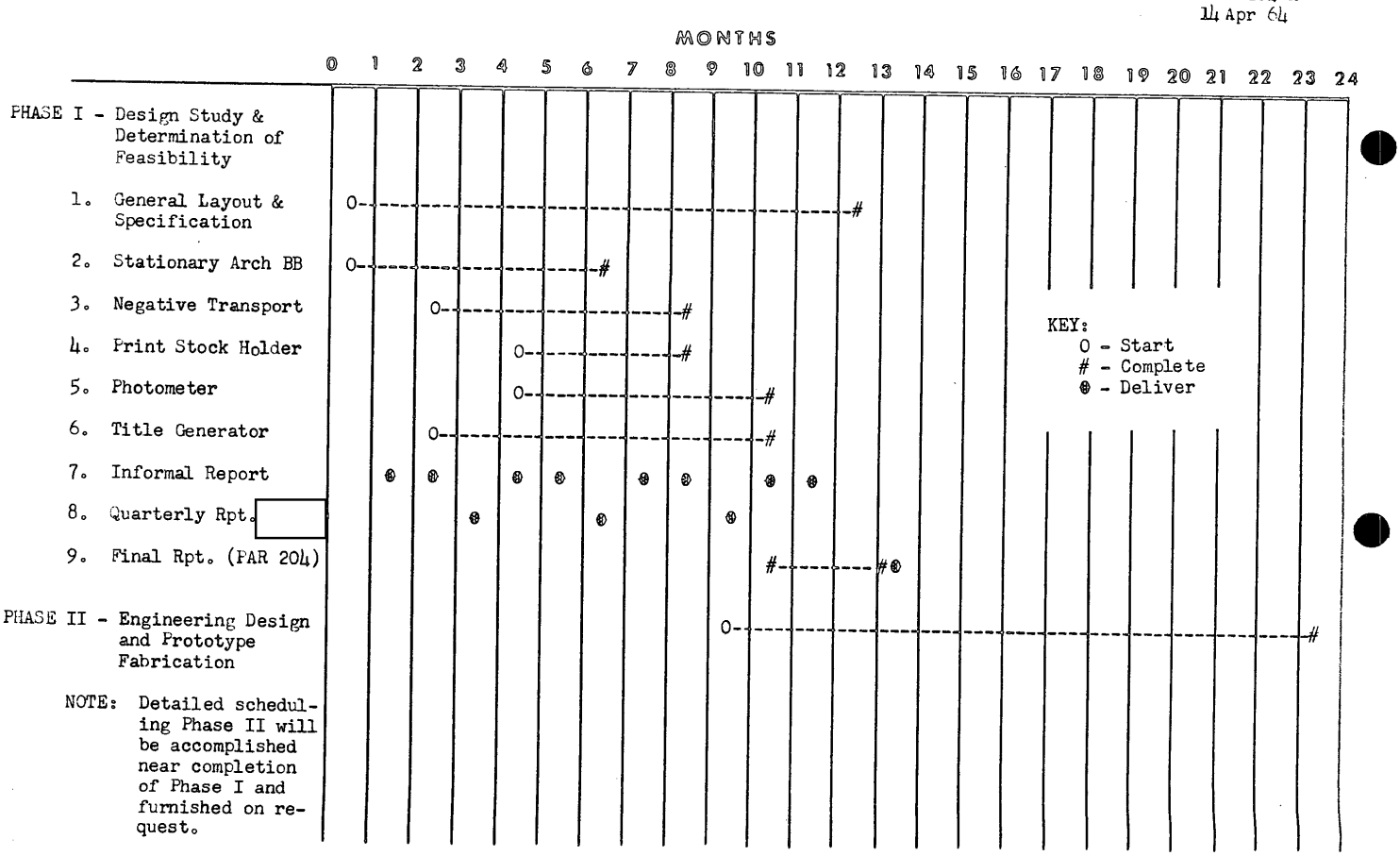


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Fig. 2